

June 29, 2017
The Honorable Rick Perry
Secretary of Energy

THANK YOU for answering the call to Make America Great Again. We hear you.

It is a pleasure to communicate with you sir, and I appreciate the focus on energy self-sufficiency. Your recent remarks on energy sources brings fresh air and hope.

The Westinghouse AP1000 --- even China's emerging CAP1400 --- are 'best of breed' but it is a dying breed. A combination of public distrust and investor disinterest makes these an impossible sell, impossible to scale within the time frame it would need to happen. Construction lead time, manufacturing bottlenecks and total hypothetical capital cost of scaling to cover the electric grid with this type of nuclear is less preposterous, but every bit as unlikely as erecting 3 million wind turbines with some environmentally unthinkable 'storage' solution.

Something new is called for. Small Modular Reactors may be the nuclear industry's answer to avoiding obscurity, sadly, and one cannot blame them (though I am starting to) for failing to exhibit the courage or desire to commit attention to molten salt research. Because what is being presented by default is a practical absurdity.

What if someone promoting utility wind approaches you and claims that wind is the future? BUT in place of today's standard size 3MW turbines it *absolutely must be* a far greater number of 1MW turbines. You'd take a step back, confident that the reason must have little to do with technology. You'd feel dubious, imagine you were being 'played' in some way. Even a layman would sense something wrong with the proposal, given the overhead of placing units.

I have the same reaction when hearing discussion of Small Modular Reactors. I see them as a high ticket luxury item that is being fronted as the 'stealth solution' to a most pressing problem, to design something faux environmentalists and radiophobes might fear and hate less, even though they could never launch the nuclear industry into a new renaissance. Utility scale electric is geared to multiple ~1GWe+ solutions per plant, the round number that could practically be multiplied into a feasible grid solution.

Aside from industry desperation I also wonder if SMRs are being promoted by a few billionaires, *not* from a desire to supply lesser developed countries (all of whom should never go in for less than 1GWe), but to power their own offshore enclaves, their survival retreats in places like New Zealand. Call it my pet conspiracy theory. They wish to see the technology put to practice on our collective dime as soon as possible. Helping to stock the pantries of billionaires may be a tidy business some day but SMR fixation *today* represents a foolish diversion of attention away from what needs to be the principal goal --- attaining energy self-sufficiency for the grid with $\geq 1\text{GWe}$ sources, less fuel volatility and less risk. This is an existential crisis.

Nuclear done right with molten salts could carry the *least risk* of any energy source. I used to worry that terrorists would try to sabotage the electric grid directly, but I now see the real emerging threat is increasing grid reliance on the natural gas distribution network, the danger is built in.

The historical correlation of newer and better ideas has been broken. Is this quote relevant in our early 21st century?

"It's burst into flames! It burst into flames, and it's falling, it's crashing! Watch it! Watch it! Get out of the way! Get out of the way! Get this, Charlie; get this, Charlie! It's fire—and it's crashing! It's crashing terrible! Oh, my! Get out of the way, please! It's burning and bursting into flames; and the—and it's falling on the mooring-mast. And all the between. This is terrible; this is the worst of the worst catastrophes in the world. Oh my Jesus! its flames... Crashing, oh! Four- or five-hundred feet into the sky and it—it's a terrific crash, ladies and gentlemen. It's smoke, and it's frame's down; and the frame is crashing to the ground, not quite to the mooring-mast. Oh, the humanity and all the passengers screaming around here..."

~Herbert Morrison, on witnessing the Hindenburg disaster, May 6, 1937

Yes it's true, I'm afraid... the United States is forging ahead with the build-out of long haul high pressure natural gas energy infrastructure with the same clueless insouciance as did the Germans building hydrogen airships. And we are doing it in a manner that is far more egregious (to common sense) than those Germans could ever claim. The very same decision-makers who would urge caution regarding oil and gas pipelines through the Middle East are turning a blind eye to the same vulnerability in our own back yard. Proposals to fuel LNG tankers for export, as well as the pipelines to crisscross our continent are fronted with the blessing of investors and insurers whose fair-weather assumptions degrade, even mock common sense.

Natural gas will always carry this risk. Gas to stove, furnace and factory (especially petrochemical, plastic and fertilizer) has always been a great idea, but in every area presently supplied gas, grid electricity is already there and is our last defense from darkness and cold. My fear is that a day is approaching where the loss of natural gas plants at the end of long haul pipelines may trigger a cascading grid failure, from a coordinated attack on the gas distribution network. These pipelines are inherently indefensible.

National Security would be best served by nuclear energy, plants that need not be above ground and require only occasional refueling from easily-defended deliveries. And what better fuel to build on for hundreds of years than Thorium, an incidental by-product of rare earth mining that is beyond 'cheap' in sufficient measure to power the grid?

It is my hope that we are brought to consensus on nuclear and especially molten salts, with the resolve of an idea whose time is come 50 years too late. In my lifetime if I may be selfish. And not in the aftermath of some silly disaster that may prompt people to say, "Well who'da thunk it" as we beg other countries such as China, for assistance.

With kindest regards,

P.S. Technology and industry that need urgent expediting include,
The two-fluid LFTR with active processing as envisioned by Weinberg.
Rare earth mining and Thorium stockpiling for research and operation.
Safe production methods for FLiBe salts (lithium fluoride and beryllium fluoride) in industrial quantity.
Closed Brayton generating systems that can be driven from natural gas (or) non-fissile molten salt loop.
HVDC (millions of volts) regulation and switching.
HVDC/HVAC interface technologies to permit efficient coast-to-coast and ultimately global grid.
Passively cooled HVDC conduit under Eisenhower highways, along railways.
A series of buried overlapping HVDC loops spanning the continent, feeding legacy grids.